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FLOOD CONTROL

SANTA CLARA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT
SOUTH ZONE

ENGINEER'S REPORT FOR IMPROVEMENT
OF
LITTLE LLAGAS-LLAGAS AVENUE TO BIG LLAGAS CREEK

Project No. S-1-1 Job No. FC 114

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SUBJECT TO REVISION

Preliminary Approval: ______________________
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Final Approval: ______________________
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SANTA CLARA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

SOUTH ZONE

ENGINEER'S REPORT FOR THE PROPOSED IMPROVEMENT OF THE LITTLE LLAGAS CREEK

INTRODUCTION: The Little Llagas originates in the mountains northwest of Morgan Hill, flows through the town in a southerly direction. South of town it flows nearly parallel to the Monterey Highway and crosses it just south of the Watsonville Road. The stream west of the Monterey Highway drains 1900 acres of mountainous land and 2500 acres of land ranging from moderately sloping to flat.

Severe flooding occurs in the areas North of Llagas Avenue, adjacent to Fifth Street, North of the Watsonville Road, and East of the Southern Pacific Railroad in the vicinity of Central Avenue. Moderate flooding occurs between Warren and Del Monte streets and along the Monterey Highway at Fourth Street.

The town is protected from extreme flooding by the following factors:

(1) Llagas Avenue acts as a dam. The culvert at this crossing is totally inadequate.

(2) The area East of the Southern Pacific Railroad, near Central Avenue has virtually no outlet and the area becomes a lake during a storm.

(3) The area West of town is still virtually undeveloped.

Because these conditions exist at the present time the town has been relatively safe.

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LITTLE LAGAS CREEK

It is likely that ranchers North of Llagas Avenue will seek to eliminate flooding in that area. Developers, both residential and industrial, will seek to improve lands which are serving now as storage areas. Should either of these conditions result, Morgan Hill would be vulnerable to severe flooding.

Topography, Soils, and Vegetation:

The basin of the Little Llagas North of Watsonville Road is very steep with elevations ranging from a high of 1400 feet to a low at the outlet of 300 feet. The distances from the tops of ridges to the channel average about one mile. The channel falls 450 feet in it's first 1.2 miles. The area contiguous to the channel is flat except through Morgan Hill where two ridges come right down into town.

The soil in the watershed is relatively impervious being classified as type Va. The mountains and hillsides are moderately wooded. There is a fair amount of grass on the hillsides and in areas not under cultivation. The areas South and East of Morgan Hill are planted in orchards and there appears to be an increase in the acreage devoted to strawberries.

East and South of the crossing of Monterey Highway the channel meanders through the valley floor. It is joined in this area by several branches which originate in the Eastern Foothills. The area is excellent for percolation to the ground water.

General Location:

The project embraces the area bounded by the drainage divide just North of Morgan Hill, the mountain ridges East and West of the valley, and the Llagas on the South and West to Rucker Avenue.

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Purpose

The purpose of this report is to describe the remedial measures necessary to control flooding from storms whose frequency of recurrence is about once every 15 years. Structures have been studied in sufficient detail so that an intelligent estimate can be made of the cost of construction based upon rates current December 27, 1955.

Description of the Project:

At Llagas Avenue the existing 36 inch culvert has a capacity of 60 c.f.s. with a two foot head. The runoff caused by the 15 year flood will be about 325 c.f.s. The inadequacy of this culvert results in the formation of a lake north of Llagas Avenue with some runoff forced north thereby contributing to the very poor drainage conditions West of the railroad between Madrone and Coyote.

South of Llagas Avenue the channel to and culvert under Wright Avenue are inadequate. South of Wright Avenue the channel has been improved. During the storm of December 23, 1955 water rose to the tops of the banks between Wright and Main Avenues. The estimated flow in the reach was about 300 c.f.s. Water was ponded West of the channel by a levee averaging 1.5 feet in height. Further, about 800 acres East of the Southern Pacific Railroad should normally drain via Central Avenue to the Little Llagas midway between Wright and Main Avenues. This drainage is blocked by the railroad and consequently the area was completely flooded.

It is estimated that the runoff in this reach for the worst storm in 15 years would be 625 c.f.s. if the storage areas mentioned above cease to function as flood detention basins.

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This means that the channel and structures downstream are inadequate for the runoff from the tributary areas.

It is quite possible that these areas which are close into Morgan Hill would be converted to subdivisions or row crops such as strawberries because of the desireable location and topography. These changes would increase the runoff greatly.

The 5x8 culverts at Main, Warren, Second, along the Monterey Highway, at Fifth, Dunne, Spring Avenues and the roads to the South are all inadequate.

The following points summarize these existing conditions.

(1) North of Wright Avenue -- General flooding in this area because of inadequate culverts under and channel between Llagas and Wright Avenues.

(2) Wright Avenue to the Monterey Highway -- Channel and structures are barely adequate to pass the 15 year storm providing no additional flow is added from those areas which now act as reservoirs.

(3) Monterey Highway South -- The culvert and channel are inadequate and flooding has occurred at Fifth, Dunne, and the Watsonville Road.

Proposed minimum improvements to provide flood control against the worst storm in 15 years:

(1) Llagas Avenue to Wright Avenue

A trapezoidal channel of 8 feet Bottom Width with 1½:1 side slopes and 4.5 feet deep including freeboard.

(2) Wright Avenue to Station 110 + 60 (Midway between Wright and Main Avenue

A trapezoidal channel of 8 ft. bottom width with 1½:1 side slopes, and 5.5 feet deep including freeboard.

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(3) Station 110 + 60 to Main Avenue

A trapezoidal channel of 8 foot bottom width with 1½:1 side slopes and 6.5 feet deep including freeboard.

(4) Main Avenue to Station 137 + 50

Realign channel to rear property lines and constructing a new channel of 8 foot bottom width with 1½:1 side slope and 7.0 feet deep including freeboard.

(5) Station 137 + 50 to Fifth Street:

Realign to rear property lines. This channel is primarily a 6 x 12 ft. box culvert with transitions. This requires 300 ft. of box culvert along rear property lines, plus 150 feet of 48 inch concrete pipe to connect the existing culvert at Monterey Highway with the new channel. Another alternative would be to retain the existing alignment, build 270 ft. of 6x10 ft. box culvert plus 150 feet of rectangular open channel with retaining walls. The first alternative removes the channel from the valuable property fronting on the Highway. Also the cost of this alternative is about the same as improving the existing alignment.

(6) Fifth Street to Dunne Avenue

A trapezoidal channel of 8 foot bottom width with 1½:1 side slope and 7.0 feet deep including freeboard.

(7) Dunne Avenue to Spring Avenue

A trapezoidal channel of 8 foot bottom width with 1½:1 side slopes and 7.2 feet deep including freeboard.

(8) Spring Avenue to Edmundson Avenue

A trapezoidal channel of 8 foot bottom width with 1½:1 side slopes and 7.5 feet deep including freeboard.

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(9) Edmundson Avenue to Llagas Creek

New Alignment (Diversion from present channel to join the Llagas Creek West of the 101 Highway thereby eliminating flooding on the Little Llagas Creek East of 101 Highway. Construct a channel of 12 ft. bottom width with 1½:1 side slopes and 8 ft. depth including freeboard.

(10) Channel improvement East of the Monterey Highway to insure positive grade and proper alignment of the channel to accomodate local drainage after completion of the diversion project.

(11) The construction of Culverts at Llagas, Wright, Main, Warren, Del Monte, Third, Fifth, Dunne, Spring, Edmundson, and West Middle Avenue and the Watsonville Road.

The project described above has been estimated on the basis of doing the work complete in one contract and also on the basis of doing the work in two stages. The first stage would be the construction of the diversion channel and structures from Edmundson Avenue to the Llagas Creek. The second stage would be the construction of the balance of the project from Llagas Avenue to Edmundson Avenue. It is of course practical to do the balance of the project in small stages working upstream from Edmundson Avenue as monies become available. The cost of rights of way has been estimated separately.

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Estimate for Complete Project

ITEM	QUANTITY AND DESCRIPTION	UNIT PRICE	TOTAL
1.	50,200 Cubic Yards Channel Excavation	0.35	17,600.00
2.	5,000 Cubic Yards Structure Excavation	3.60	18,000.00
3.	1,440 Cubic Yards Concrete Structure	64.00	92,000.00
4.	174,000 lbs. Reinforcing Steel	0.125	21,750.00
5.	12 Farm Bridges	2,000.00	24,000.00
6.	500 Cubic Yards Concrete Channel Lining	34.00	17,000.00
7.	150 Lineal Feet 48" Reinf. Conc. Pipe	17.20	2,600.00
8.	480 Lineal Feet 15" Reinf. conc. Pipe	4.54	2,180.00
9.	26 Drainage Inlets, complete	260.00	6,750.00
10.	Relocate Utilities at New Culverts	(Lump Sum)	5,000.00
11.	550 Square Yards of 6 inch Base Course	0.60	330.00
12.	550 Square Yards of Asphalt Paving	3.00	1,650.00
13.	600 Lineal Feet Bridge Railing	5.00	3,000.00
14.	Clearing the Little Llagas east of Monterey Highway		4,000.00
		Total	215,860.00

Little Llagas Creek

Estimated Cost of Rights of Way

1. From Llagas Avenue to Wright Avenue the new channel more or less follows the existing channel but additional lands are required for the improved channel. The benefit to the property owners should more than offset the grant of the required right of way to the Flood Control District. However a nominal cost has been applied as follows:

3.6 acres at $500.00 $1,800.00

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2. From Wright Avenue to Main Avenue there should be no cost of rights of way as the present channel follows the present route of Hale Avenue (dedicated on Morgan Hill Ranch Map No. 3) and it should be feasible for the District and the City to Construct both the required channel and a two way street in the existing 66 foot right of way.

3. From Main Avenue to Dunne Avenue the Route follows the existing channels through a densely populated area and it will be difficult to acquire the necessary rights of way. The cost is estimated as follows:

3.6 acres @ $5,000.00 $18,000.00

4. From Dunne Avenue to a point approximately 1000 feet south of Spring Avenue the State of California has a presently acquired a 20 ft. right of way for the channel as built. The District should be able to acquire the right of way necessary for widening at a reasonable cost, though this is property in the process of subdividing:

2.0 acres @ $3,000.00 6,000.00

5. From a point approximately 1000 feet south of Spring Avenue to Edmundson Avenue the channel flows through orchard land and near the City of Morgan Hill Sewage Treatment Plant. There is no right of way deeded for the present channel and it will be necessary to acquire it in total:

3.1 acres @ $2,000.00 6,200.00

6. From Edmundson Avenue to the Watsonville Road the channel is to be diverted to a new location. Without exception the channel will be over the same property owners as the existing channel. The land is presently pasture land and is not highly

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developed. The new channel will benefit the present owners as the land is now subject to flooding. It is possible that right of way can be acquired without cost. A nominal cost has been estimated:

5.2 acres @ $500.00 $2,600.00

7. From Edmundson Avenue almost to the Llagas Creek the new channel follows rear property lines through prune orchards with the exception of the last 900 feet, where the land is now in permanent pasture and there will be severance:

6.9 acres @ $2,500.00 $17,250.00

Estimate for State One

Diversion Channel Edmundson Avenue to Big Llagas Creek

ITEM	QUANTITY AND DESCRIPTION	UNIT PRICE	TOTAL
1.	36,058 Cubic Yards Channel Excavation	0.35	$12,630.00
2.	500 Cubic Yards Structure Excavation	3.60	1,800.00
3.	240 Cubic Yards Concrete Structure	64.00	15,360.00
4.	28,500 lbs. Reinforcing Steel	0.125	3,550.00
5.	2 Form Bridges	2,000.00	4,000.00
6.	6 Drainage Inlets Complete	260.00	1,560.00
7.	135 Square Yards of 6" Base	0.60	81.00
8.	135 Square Yards of Asphalt Paving	3.00	405.00
9.	150 Lineal Feet Bridge Railing	5.00	750.00
10.	2 of Right of Way(Lump Sum)		19,850.00
		Total	$59,986.00

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Estimate for Stage Two

Channel Improvements Llagas Avenue to Edmundson Avenue

ITEM	QUANTITY AND DESCRIPTION	UNIT PRICE	TOTAL
1.	14142 Cubic Yards Channel Excavation	0.35	$ 4,970.00
2.	4500 Cubic Yards Structure Excavation	3.60	16,200.00
3.	1200 Cubic Yards Concrete Structure	64.00	76,640.00
4.	145,500 lbs. Reinforcing Steel	0.125	18,200.00
5.	10 Farm Bridges	2000.00	20,000.00
6.	500 Cubic Yards Concrete Channel Lining	34.00	17,000.00
7.	150 Lineal Feet 48" R. C. P.	17.20	2,600.00
8.	480 Lineal Feet 15" R. C. P.	4.54	2,180.00
9.	20 Drainage Inlets Complete	260.00	5,200.00
10.	Relocate Utilities at New Culverts (Lump Sum)		5,000.00
11.	415 Square Yards of 6" Base Course	0.60	249.00
12.	415 Square Yards of Asphalt Paving	3.00	1,245.00
13.	450 Lineal Feet Bridge Railing	5.00	2,250.00
14.	Right of Way (Lump Sum)		32,000.00
		Total	$203,734.00

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